

# Strategies for Pedagogical Integration of Information and Communication Technologies in a Teaching-Learning Situation at the Imani School Complex in the City of Lubumbashi

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**Abstract:** *In this study, our main concern is to see teachers integrate pedagogically ICT in their scenarios to update their knowledge, improve their career and make their professional practices otherwise. To achieve such integration, the teacher must internalize these different levels or phases listed below. The problem of integrating ICTs is a major concern which constitutes the brake for the development of our Congolese society in general and of our Lushoises schools in particular. Our study is therefore very important in that it seeks to identify the problem related to the pedagogical integration of ICTs, to identify strategies based on teaching practices and to propose a model of ICT integration capable of responding to social requirements of the city of Lubumbashi, the Democratic Republic of Congo in general and the Imani School Complex in particular.*

**Keywords:** Integration, ICT, Learning, Teaching

## 1. Introduction

Nowadays, Information and Communication Technologies (ICT) are experiencing a huge scale and a vertiginous development even without comparison. This development concerns almost all areas of human life, namely: in research, in commerce, in transport, in telecommunications, in the army, in education and more precisely in the classroom... For many Such integration seems to be inevitable in the future, to promote the educational success of students, enhance the professionalism of teaching staff, encourage management leadership, and even collaboration between the school, the family and the community (Poyet, 2009). Technology is always a necessity in the context of research because of rapid changes in society, and advances in knowledge and demand for updated educational research. The relationship between technology and pedagogy has many anchors, according to Lebrun (2011).

Our observation made in particular to the Imani school complex regarding the use of ICT is also deplorable both at school level, at the level of the city of Lubumbashi and in our country, the Democratic Republic of Congo in general, has aroused in us a scientific curiosity to be able to conduct a study that can allow us to identify the problem related to the pedagogical integration of ICT, in order to identify strategies from teaching practices, through the teaching-learning process and propose a model of technological integration likely to meet the requirements of our environment. This thirst for discovery has motivated us to conduct this research to propose possible solutions for successful educational integration of ICT in the teaching-learning system.

This work will serve as a source of inspiration for education officers and school leaders, mainly teachers who will use these findings to understand the benefits and opportunities that ICT can provide by applying them in their teaching

profession. On the scientific side, this work will help fill a gap in the scientific journal in our faculty for the field of educational technology. It would be equally relevant to stress the importance of organizing learning activities with ICTs in schools.

## 2. Research Problem

ICTs today constitute a vector of development for our society that spares no area in both professional and social terms. Our country the DRC needs its integration in all the social sectors of the life of the man. Our schools are full of great potential both in terms of technological equipment and in terms of human resources; it is up to us as a researcher in this field to ask the question at what level the educational integration of ICT blocks.

According to Legendre (1993) cited by Mukendi waMpoi (2016), integration, in a broad sense, refers to the "action of making various elements interact in order to constitute a harmonious whole and of a higher level".

The integration of ICT in education means a harmonious cohesion between ICTs and all the links in the education chain to produce better education and learning.

For Karsenti (2009), integrating ICT is not the technological gap that everyone is talking about, but rather the educational gap where ICTs are taught to students as if they had never seen hardware stores commonly called cybercafés, as if they do not know mobile phones and as if they were born in another era.

The author goes on to say that in Africa, we do not see ICT as a discipline to be taught, to learn by heart. However, the pedagogical integration of ICT is much more, therefore, the use of ICT by teachers or students in order to develop skills or to promote learning and especially for students, it is to

make them use ICTs to learn sciences, languages, mathematics.

For TshameniNgamo (2007), the development of ICT in schools is implied by several prerequisites, among which we note the most important ones which are:

- The need to define the clear objectives that justify the application of ICT in the education system;
- The creation of institutional structures to guide the development of national policies that support the development of education through ICTs;
- Creation and maintenance of technical and pedagogical expertise trained in ICTs;
- And then establishing partnerships to promote cost-sharing between the state, national and international partners, the private sector and civil society.

Thus, each stakeholder in an institution should be able to use ICTs effectively and efficiently to carry out the task assigned to them. At this level Dias (1999), says in this regard that "technologies are integrated when they are used continuously to support and further develop the objectives of the program and to engage students in meaningful learning".

To support this idea, other authors such as Hadley, (1993), Parks, (1994) and Depover, (1996) cited by Mukendi waMpoyi (2016) believe that to speak of integration ICT should be used in a meaningful way. "Daily", "usual", "regular" or "frequent".

Despite the recognition of the potential of ICTs and educational technologies in education, despite the fact that most education systems have put ICTs at the forefront of their school and academic programs, and even some schools already have a considerable computer park, many studies carried out still mention a minimal pedagogical use of ICT by the teachers. Karsenti, Savoie-Zajc and Larose (2002) confirmed this weak integration of ICT in schools. They concluded that further research is needed to understand how to help practicing teachers move towards more and more effective integration of ICTs, so that students can learn more and better through ICTs over time.

Researchers who have examined this issue demonstrate that ICT integration is a process. They point out that it is scalable, that is, that it unfolds over a series of stages from non-use to exemplary use.

In recent years, we note that in the Democratic Republic of Congo the level of ICT use has increased significantly compared to previous years. The level of use observed on the web and on social networks gives the impression that the pedagogical integration of ICT is effective, whereas in reality it is only personal and private use of ICT.

Basing ourselves from the point of view of teachers, we ask ourselves the following questions:

What are the possible strategies for the pedagogical integration of ICT in a teaching-learning situation?

From the main question there are specific or secondary questions, as follows:

- 1) What are the needs related to the pedagogical integration of ICT in a teaching-learning situation?

- 2) What are the strategies for effective ICT integration in education?
- 3) What model is applicable in Lushoise schools in general and in particular in the Imani school complex for pedagogical integration of ICT?

### **Hypotheses**

To justify this state of affairs, several factors are mentioned by the actors of the education system in the report of the competency-based approach. To do this, we answer our questions in this way:

The personal use of ICTs, the lack of hardware and software, the training of users in the use of ICTs would be a handicap for integration with teachers, parents and students of the Imani School Complex.

### **3. General Objective of Research**

In undertaking this study, our overall goal is to Understand ICT pedagogical integration strategies to help improve the quality of teaching and learning in the Democratic Republic of Congo in general and Lubumbashi in particular.

This led us to a specific objective to identify the problem related to the pedagogical integration of ICT, that of identifying strategies from teaching practices that strategies can or could meet the constraints of the environment and propose an integrative model that can respond to requirements of our environment, of course the city of Lubumbashi in general and the Imani School Complex in particular.

### **4. Delimitation of the Subject**

From a temporal point of view, our research covers a period of one 2015-2016 school year. And in terms of space, our setting is the IMANI School Complex located in Lubumbashi commune in Makutano District, Kasavubu and Moero avenues intersection, number 360 on Kasavubu Avenue and number 241 on Moero Avenue. In its content, this study is only of interest to secondary school teachers.

#### **1) Theoretical Aspects**

Some models of ICT integration according to Mukendi waMpoyi (2016). The educational technology literature has identified some explanatory models of this process of ICT integration, the list below is not exhaustive: - the MOERSCH model (1995, 2001); the model of SANDHOLTZ, RINGSTAFF and DWYER (1997); - the MORAIS Model (2001); the RABY model (2004), the Karsenti ASPID model (2004).

#### **a) The MOERSCH Model (1995, 2001)**

MOERSCH has developed a measurement tool to evaluate the level of ICT implementation in the classroom, which is spread over seven levels, by which the teacher evolves when he develops his expertise to integrate ICT in the classroom.

- The zero level represents non-use, a stage during which the teacher perceives lack of accessibility and time as obstacles to the use of ICT.
- Level 1 is that of awareness. It can be lived differently by each teacher. The latter may be in indirect contact with the

ICTs present in his environment (egg: floating counting program using ICT, computer course offered at lunchtime, etc.), using ICT for classroom management (egg: take attendance, compile student results, correspond via e-mail, prepare lessons, etc.) or use ICTs to support teaching.

- Level 2 is that of exploration. The teacher uses ICT as a complement to his teaching during reinforcement, enrichment, repetitive exercises, and games or for the research of information (knowledge) on a content under study.
- Level 3 is infusion. The teacher uses technological tools (egg database, spreadsheet, graph, multimedia application, Internet, etc.) on an ad hoc basis, during pedagogical activities favoring the processing of information and reasoning structures. Higher level (egg problem solving, decision making, reflective thinking, experimentation, etc.).
- Level 4 is that of integration. This is the pivotal moment difficult to cross. The teacher then uses ICTs, not in isolation, but by engaging his / her students in a rich learning context in which they use ICTs (i.e. multimedia applications, telecommunications, basics, data sheet, and spreadsheet, word processor) to identify and solve real problems related to a central theme or concept.

The level of integration is, in the revised model (Moersch, 2001), divided into two sub-levels:

- Mechanical Integration
- Routine Integration

To highlight the fact that the teacher needs external help (colleagues, pedagogical advisor, commercial pedagogical material, etc.) before reaching a routine and independent integration.

- Level 5 is expansion. Again in a context of problem solving, the use of ICT makes it possible to come into contact with the outside world.
- The last level, level 6 is the stage of refinement, where the teacher uses ICT to allow students to search for information, find solutions and develop a product related to real problems, and above all, in connection with their own interests, needs and aspirations.

## **2) The model of SANDHOLTZ, RINGSTAFF and DWYER (1997)**

Sandholtz, Ringstaff and Dwyer have developed a model of pedagogical integration of ICT that is divided into 5 stages: - entry, - adoption, - adaptation, appropriation, and - invention.

According to this model, the teacher moves from the entry stage, where he becomes familiar with the technological equipment in his classroom, at the adaptation stage where he uses ICT in repetitive exercises, at the stage of appropriation, where he transforms his teaching methods to foster the acquisition of new skills among students. In the final stage, that of invention, teachers adopt new teaching methods that focus on knowledge building, problem solving and critical thinking, and that enable the full potential of ICTs to be realized.

This model assumes that during the ICT integration process, teachers must necessarily transform their practice from a

teaching-based approach to a more learning-oriented approach.

## **3) The model of MORAIS (2001)**

According to MORAIS this model defines two phases to the pedagogical integration of ICT: the initiation phase and - the phase of use.

### **a) The initiation phase**

This phase takes place in two stages: - relevance and fear. "Relevance" is the period during which the teacher wonders if ICT can improve his teaching practices. Once convinced of the positive impact that ICTs can have on his teaching practices, he faces feelings of anxiety, fear, uncertainty and insecurity related to change.

### **b) The phase of use**

It takes place in three stages:

- The personal use stage where the teacher uses ICT for his personal needs, excluding his students;
- The professional use stage during which the teacher uses ICT to perform his administrative duties.
- The pedagogical use stage during which the teacher uses ICT to improve the teaching and learning of his students who are thus involved ...

Thus, the teacher uses progressively and systematically technologies as personal, professional tools and achievement of pedagogical activities or teaching-learning. It must systematically and progressively follow these three steps to access an educational use of ICT.

However, this model of Morais is linear, and does not clearly define the steps that a teacher goes through as he progresses towards an exemplary use of ICT.

## **4) RABY'S ICT Integration Model (2004)**

This model by Raby (2004) illustrates a process that leads from non-use to the exemplary use of ICT.

It is divided into four stages: awareness, personal use, professional use and educational use.

- a) Awareness stage: The teacher is in indirect contact with the ICT present in his personal and / or professional environment. At this stage, the teacher has little or no direct contact with ICT, but he is surrounded by people who use and appreciate them.
- b) The awareness stage will be followed by the stage of personal use, professional use and pedagogical use, depending on the motivations that motivate each teacher to continue his process of ICT integration.

So:

- The teacher motivated to use ICTs with a curiosity or personal need, will enter the personal use stage first. He will then continue his journey through the stages of professional use or educational use.
- A teacher who is motivated by a curiosity, a need or a professional obligation will move directly from the awareness stage to the professional use stage. This teacher will then go through the stages of personal use and pedagogical use later on.
- a teacher initially motivated by a curiosity, a need or an obligation of a pedagogical nature, will pass directly from the stage of awareness to the stage of educational use and will cross the stages of personal use and professional use thereafter.

- The stage of personal use consists of three stages: motivation, familiarization and exploration-appropriation. At the familiarization stage, the teacher learns to master the technical basics, that is, a basic knowledge of some software, and not a technical knowledge of operating systems. The teacher who has previously undertaken another stage (professional use or pedagogical use), may go through the familiarization stage more quickly (or even avoid). The teacher then progresses to a stage of exploration, and with the time of appropriation, during which he seeks information on subjects of personal interest, communicates with his family and friends and uses technological tools to produce documents. In relation to his personal needs.
  - During the professional use stage, the teacher goes through a more or less long familiarization stage, then reaches the stage of pedagogical use and touches on the use of ICT for educational purposes. It is during this stage that the teacher brings his students to use ICT in the classroom.
  - The pedagogical use stage begins with:
    - a) A curiosity, a need or an obligation of a pedagogical nature (motivation) on the part of the teacher.
    - b) Teachers, who feel obliged to integrate ICT into their teaching, without having previously undertaken the stages of personal and / or professional use, can go through a long and painful familiarization stage. During this stage, they slowly learn to master the technical basics. Teachers can then engage their students in the use of technological tools as a reward or occupation.
    - c) At the exploration stage, the teacher uses ICT to enrich his teaching. He engages his students in activities aimed at acquiring, understanding and applying knowledge. These activities also allow the development of cross-curricular competence related to ICT.
    - d) At the brewing stage, the teacher involves his pupils in a specific and isolated use of ICT. The student therefore uses ICT during transmission and knowledge building activities proposed by the teacher.
    - e) The appropriation stage is marked by frequent and regular use of ICT by students in an active and meaningful learning environment. This type of pedagogical use is characterized by a combination of transmission activities and the construction of knowledge oriented toward the pursuit of a goal.
- The former will lead to a deterioration of its teaching, since the main educational gaps will have been accentuated by the misuse of technologies in the school context;
  - The other path is the one where we arrive at the substitution phase. At this stage, it is possible to reproduce what was done before in the classroom, with the same relative efficiency, but this time with the technologies.
- c) Then, there is the phase of progress where the use of technologies really makes it possible to teach more effectively. At this stage, therefore, there is marked progress in the way he teaches. And this progress is also reflected on learners.
  - d) Finally comes the phase of innovation, or even evolution in the act of teaching, in the Darwinian sense. There, it is possible to teach or carry out school tasks, with the help of technologies, as it would never have been possible to do without them.
  - e) All phases of this model are related to the level of techno pedagogical collaborative engagement of the teacher. Nevertheless, it is important to understand that increased engagement will not necessarily lead to the highest level.

This commitment must also be reflected, be done by collaborating with its peers (to learn and learn), - by listening to its learners, - by learning about the latest advances in the field of technologies in education in order to really be able to evolve in one's practice.

Finally, a model for the adoption and pedagogical integration of technologies in an educational context cannot be complete without taking into account the degree of responsible use of technology by learners for learning purposes. In other words, according to the ASPID model and therefore from the perspective of the adoption and pedagogical integration of technologies for teaching and learning purposes, it is at once imperative to:

- Seek to progress as a teacher towards the INNOVATION level;
- Aim for all learners to use technology more and more, responsibly, and to learn.

#### **Aspect Methodology**

In order to achieve the objectives we have set ourselves in this research, we used the qualitative method and the semi-directive interview technique to record the collected data. At this level it should be pointed out that our series of questions were all open, we presented the answers as each respondent reacted and then we grouped these responses into themes as follows: Identification of the teaching strategies of use of ICT, ICT training and use, teacher-developed skills in the use of ICTs in education, students' perceptions and motivation for ICT use in class, and constraints and suggestions on the use of ICTs. Our school population consists of 36 teachers of C.S. Imani sections combined (kindergarten, primary and secondary). From this school population, we extracted a sample of 6 secondary school teachers from five different domains, so our sample is drawn occasionally.

#### **5) The ASPID model of T. Karsenti (2014)**

The ASPID model (adoption, substitution, progress, innovation, deterioration) aims to model the process of adoption and pedagogical integration of technologies in an educational context. Karsenti has been inspired by both surveys of more than 50,000 students and teachers over the past 10 years, as well as some 1,500 hours of classroom observation using various technologies: laptop, iPad, touch pad, interactive whiteboard, smart phone, etc. These observations were also made in various teaching contexts - from kindergarten to university - and on several continents.

- a) The first phase of this model represents the adoption phase, where it is normal, at least in the beginning, that familiarization with the integration of technologies into one's teaching takes longer.
- b) Then, there are two very different paths that a teacher can take:

## 5. Search Results

In this part, far from any kind of literature, we have synthesized the data collected from different teachers. They are presented below as follows:

- Teachers at the Imani School Complex use computers, smartphones to connect to the internet and conduct research or communicate with colleagues.
- They do not receive any training or logistical assistance for the promotion of ICT in their profession;
- Teachers use ICT as a teaching aid to facilitate learning. They have now acquired automatism. They develop the skills of practice, creativity, participation, mastery of the use of ICT in students in their course.
- Learners have a positive feeling. They are stimulated and curious, even interested in taking the course with projection, because they see the outside world brought closer to them thanks to ICT;
- They display a positive, good, interesting feeling. They think that thanks to ICT, they save time and conform to globalization;
- In teaching practice with ICT, teachers have some difficulties, among others: the instability of the electric current, the disruption of the Internet connection;
- As remedies for these problems, they propose that the State take charge of the popularization or dissemination of these ICTs, the motivation of teachers and the organization of training for ICT users.

## 6. Discussion of the Results

The results as presented above have no meaning if they are not interpreted. Here is an opportunity for us to discuss them and give them a specific meaning depending on the context in which our study is found.

After analyzing the results related to the identification of teaching-learning strategies, there is a conclusion that the use of computers, smartphones or other portable devices can be useful for us to connect or communicate and to be used in the transmission of knowledge as didactic support. At this level, it is important to underline that the crew of the classes and schools in technological tools is necessary to make the lessons attractive, motivating, interactive... It is a level that Moersch (1995-2001) call level of awareness in which the teacher is in the presence of ICT in his environment, in physical contact, but without a direct pedagogical link.

Based on the use and quality of training or logistical assistance in ICT based on the data collected, we are honored to report that no training or logistical assistance was reported, these teachers are doing their own thing. Even to their sad fate. Here it is important to underline the idea of Fullan (2001) of the valorization of the continuous training of the users and Jonnaert (2006) quoted by Mukendi WaMpoyi (2016) in his theory socioconstructivism where he says that knowledge must be built in collaboration with the community and the actors of education.

In relation to the development of teachers' skills in the use of ICTs in education, the results show us that teachers use ICT as a teaching aid to facilitate learning, raise the level of

pupils, they have now acquired the automatism as Winkin (1988) describes as a communication in which information is developed, exchanged and negotiated between partners in the context of social interaction. They develop the skills of the practice, the creativity, the participation, the mastery of the use of the ICT in the pupils in their courses. This development corresponds to that mentioned by TshameniNgamo (2007) cited above. At this level J-P Cuq (2003) adds that ICTs allow delocalized access to authentic multimedia resources.

By analyzing the results referring to the motivation and perception of students in the classroom, the data collected on motivation reveal that it was positive and interesting about the projected lessons, they feel close to the distant elements and in terms of perception: it is positive, good, interesting because we save time by conforming to globalization in order to be up to date.

In analyzing the results in relation to the difficulties teachers encounter with the use of ICTs in the teaching scenarios, it is appropriate to say that they find the instability of the electric current and the disruption of the connection especially during the periods close to political demonstrations.

Karsenti et al. (2011, p2), believe that the pedagogical integration of ICT faces several challenges that a review of the literature invites us to classify into four categories, namely: infrastructure challenges (power outage and internet network), challenges of computer equipment, challenges of human nature (lack of technological skills of teachers, training in technopedagogical skills and financial challenges (lack of sustainable financing of ICT integration projects).

## 7. Conclusion and Recommendations

The integration of ICTs is a topical issue of great concern to administrators of educational institutions, teachers, parents, students and even the national and provincial governments. Creating a school is one thing and equipping it with the latest generation of tools that allow the flow of lessons learned is another.

This study focuses on the identification of the problems that hinder the integration of ICT in Congolese schools in order to propose a model among those that exist, one that could meet the social requirements of our environment and allow a successful technological integration in schools. Pedagogical practices of teachers in the DRC in general and the Imani school complex in particular. This research was carried out at the Imani school complex secondary section with teachers to discover the problems related to the complete non-integration of ICT within the said complex.

Using the qualitative method supported by the semi-directive interview technique to record the relative data collected, we are at the following reality: the teachers of the Imani school complex resort to the computer, the smartphone to connect to the internet and conduct research, communicate with colleagues. No training or assistance to promote ICT in their profession; ICT is used as a teaching aid to facilitate learning; they develop practical skills, creativity, participation ... they feel positive, interesting,

well-motivated, they win time; several difficulties are to report the instabilities of the electric current and the disruption of the internet connection...

After analyzing and interpreting the results, it is appropriate for us to propose the following:

- The development of strategies that rely on different approaches by involving different actors such as: students, parents, teachers and ICT experts;
- Analyze the Congolese context of implementation of ICT integration programs in the teaching-learning process, academic research and administrative management of higher education and university institutions;
- The Congolese government through the ministry of guardianship should be involved in the process of pedagogical integration of ICT in our schools and also provide an institutional measure that can encourage teachers who use ICT pedagogically;
- The redefinition of a real policy of pedagogical integration of ICT in schools which emphasizes the importance of using ICT as a means and not as a learning object;
- Increased awareness of teachers about the use of ICTs in their teaching practices;
- And take into account the models proposed in this work for a pedagogical integration of successful ICT in schools of the DR Congo in general and those of the city of Lubumbashi in particular more specifically to CS Imani.

Thus, in this study, we opt for the ASPID model of Karsenti (2014) because it was made on the basis of several observations, in various teaching contexts and applicable on several continents. Indeed, not to engage more can not necessarily allow reaching the highest level. But this commitment must also be reflected, be done by collaborating with its peers (to learn and learn), - by listening to its learners, - by learning about the latest advances in the field of technology education, in order to truly be able to evolve in practice.

According to the ASPID model and therefore from the perspective of the adoption and pedagogical integration of technologies for teaching and learning purposes, it is at once imperative to:

- Seek to progress as a teacher towards the INNOVATION level;
- To ensure that all learners use technology more and more, responsibly, and to learn.

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